

R E M A R K S

Reconsideration of this application, as amended, is respectfully requested.

THE DRAWINGS

Figs. 11-14 have been amended to be labeled as "Prior Art" as required by the Examiner.

Submitted herewith are a corrected sheet of formal drawing which incorporates the amendments and an annotated sheet showing the changes made thereto.

No new matter has been added, and it is respectfully requested that the Examiner's objection to the drawings be withdrawn.

THE CLAIMS

Independent claim 9 has been amended to clarify that the at least three spherical or approximately spherical surfaces of the tip electrode are connected by a curved surface and are unbroken, as clearly shown in the drawings.

In addition, claim 24 has been amended to correct a typographical error.

No new matter has been added, and it is respectfully requested that the amendments to the claims be approved and entered under 37 CFR 1.116.

THE PRIOR ART REJECTION

Claims 9, 10, 23 and 24 were rejected under 35 USC 102 as being anticipated by US 2003/0004506 ("Messing"), and claims 11-22 were rejected under 35 USC 103 as being obvious over Messing. These rejections, however, are respectfully traversed with respect to the claims as amended hereinabove.

According to the present invention as recited in independent claim 9, a tip electrode is provided which is formed of a single metallic body. As recited in independent claim 9, a surface of the single-body tip electrode comprises at least three spherical or approximately spherical surfaces which have centers on a same straight line and a reduced-diameter portion provided between each of the adjacent spherical or approximately spherical surfaces such that the adjacent spherical or approximately spherical surfaces are connected by a curved surface, wherein each said reduced-diameter portion has an outer diameter that is less than an outer diameter of each of the spherical or approximately spherical surfaces. Significantly, as recited in clarified amended independent claim 9, the at least three connected spherical or approximately spherical surfaces of the tip electrode are unbroken.

With this structure, the strongest line of electric force is emitted from the outermost circumferential portion of each approximately spherical surface. In other words, virtually three

lines of electric force are emitted from a tip electrode comprising at least three unbroken spherical or approximately spherical surfaces which have centers on a same straight line and which are connected by a curved surface. Since the lines of electric force repel each other due to the exclusion effect of lines of electric force, an advantageous effect is produced whereby the output power at the center is enhanced. As a result, the line of electric force at the center can penetrate a tissue of an organism directly into deep regions, and cauterization is achieved effectively. See the disclosure in the specification at page 12, line 22 to page 13, line 7. In addition, since the tip electrode has a smooth shape formed by connecting three or more unbroken approximately spherical surfaces to each other with a curved surface, the tip electrode is cooled by the circulating blood stream and coagulation of blood causing thrombosis can be suppressed. See the disclosure in the specification at page 12, lines 14-18.

It is respectfully submitted that Messing fails to disclose, teach or suggest the above described claimed features and advantageous effects of the ablation catheter of the present invention as recited in amended independent claim 9.

On page 3 of the Final Office Action, the Examiner asserts that Fig. 5 of Messing discloses a tip electrode in which "a reduced diameter portion (520) is provided between each of the

adjacent spherical surfaces such that the spherical surfaces are connected by a curved surface." It is respectfully pointed out, however, that the adjacent spherical or approximately spherical surfaces shown in Fig. 5 of Messing are not connected by a curved surface and are not unbroken. Instead, as shown in Fig. 5 of Messing, the adjacent spherical surfaces are separated by the exit ports 520 in the concave sections 515 of the tip housing 510. Thus, contrary to the structure of the claimed present invention, Messing clearly does not disclose, teach or suggest a tip electrode comprising at least three spherical or approximately spherical surfaces that are connected by a curved surface and that are unbroken.

It is respectfully pointed out, moreover, that the invention disclosed in Messing relates to increasing a cooling effect of a catheter by providing irrigating channels (see Figs. 1-3, 4A, 4B, and 5-9) or by using a thin walled tip electrode (see Fig. 10). And it is respectfully submitted that the structures disclosed in Messing do not achieve the advantageous effects of the claimed present invention whereby the ablation catheter is brought into excellent contact with organisms, provides excellent output power, and is easily cooled by the circulating blood stream.

In addition, it is respectfully pointed out that with the structure disclosed in Messing, when there is any defect portion

on the surface of a tip electrode, such as the exit port 520, which destroys or compromises a curved surface, the edge portion formed at the connecting portion of the curved surface and the exit port 520 would result in a local concentration of electric charges. Consequently, a satisfactory ablation into sufficiently deep and wide regions cannot be attained in the case of radio-frequency electric current ablation.

In short, it is respectfully submitted that Messing fails to disclose, teach or suggest the structural features of the ablation catheter of the present invention whereby the at least three connected spherical or approximately spherical surfaces of the tip electrode are connected by a curved surface and are unbroken, as recited in amended independent claim 9.

Accordingly, it is respectfully submitted that amended independent claim 9 and claims 10-24 depending therefrom clearly patentably distinguish over Messing under 35 USC 102 as well as under 35 USC 103.

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In view of the foregoing, entry of this Amendment, allowance of the claims and the passing of this application to issue are respectfully solicited.

If the Examiner has any comments, questions, objections or recommendations, the Examiner is invited to telephone the undersigned at the telephone number given below for prompt action.

Respectfully submitted,

/Douglas Holtz/

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